Remarks

Claim 1 has been amended to insert Markush language. Claims 14-18 have been amended to correct the dependency.

Rejection Under 35 U.S.C. § 112, first paragraph

Claims 1, 6, 7, 10 and 14-21 were rejected under 35 U.S.C. § 112, first paragraph, as not being enabled. Applicants respectfully traverse this rejection.

The examiner's rejection simply fails to accord with common scientific knowledge. The genes encoding the claimed enzymes are well known – indeed, they are in the public domain, some are commercially available, and all are described in the scientific literature.

Applicants are not claiming the enzymes or their genes alone. Applicants are claiming a system for making polymers by bacterial fermentation wherein the useful substrates, and resulting products, are modified by the selection of the genes expressed by the host expression system.

Applicants have limited the host to a single expression system: *E. coli*, which has been used for bacterial fermentations for probably close to fifty years. Applicants own patents on engineering of bacteria and plants to express a phbC polymerase gene and a phbB reductase gene issued on patent applications filed in 1987, more than fifteen years ago. Applicants have spent those fifteen years identifying other enzymes that can be used to modify the resulting polymers. The massive amount of prior art clearly demonstrates that the field is not unpredictable, that once one identifies the enzymes to be used, based on their known substrates and known reaction products, it becomes routine to insert the genes encoding those enzymes.

The Legal Standard for Enablement

The Court of Appeals for the Federal Circuit (CAFC) has described the legal standard for enablement under § 112, first paragraph, as whether one skilled in the art could make and use the claimed invention from the disclosures in the patent coupled with information known in the art, without undue experimentation (*See, e.g., Genentech, Inc. v. Novo Nordisk A/S*, 108 F3d at 165, 42 USPQ2d at 1004 (quoting *In re Wright*, 999 F.2d 1557, 1561, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993); See also *In re Fisher*, 427 F.2d at 839, 166 USPQ at 24; *United States v. Telectronics, Inc.*, 857 F.2d 778 (Fed. Cir. 1988); *In re Stephens*, 529 F.2d 1343 (CCPA 1976)). The fact that experimentation may be complex does not necessarily make it undue, if the art typically engages in such experimentation (*M.I.T. v. A.B. Fortia*, 774 F.2d 1104 (Fed. Cir. 1985)). In addition, as affirmed by the Court in *Spectra-Physics, Inc. v. Coherent, Inc.*, 827 F.2d 1524 (Fed. Cir. 1987), a patent need not teach, and preferably omits, what is well known in the art.

Whether the disclosure is enabling is a legal conclusion based upon several underlying factual inquiries. See *In re Wands*, 858 F.2d 731, 735, 736-737, 8 USPQ2d 1400, 1402, 1404 (Fed. Cir. 1988). As set forth in *Wands*, the factors to be considered in determining whether a claimed invention is enabled throughout its scope without undue experimentation include the quantity of experimentation necessary, the amount of direction or guidance presented, the presence or absence of working examples, the nature of the invention, the state of the prior art, the relative skill of those in the art, the predictability or unpredictability of the art, and the breadth of the claims. In cases that involve unpredictable factors, "the scope of the enablement

obviously varies inversely with the degree of unpredictability of the factors involved." *In re Fisher*, 427 F.2d 833, 839, 166 USPQ 18, 24 (CCPA 1970). The fact that some experimentation is necessary does not preclude enablement; what is required is that the amount of experimentation 'must not be unduly extensive.' *Atlas Powder Co., v. E.I. DuPont De Nemours & Co.*, 750 F.2d 1569, 1576, 224 USPQ 409, 413 (Fed. Cir. 1984).

The Factual Analysis

Although there is no requirement for examples applicants have provided numerous working examples. The enzymes are clearly defined by their substrates and their products. As discussed throughout the specification (and in the Examples), each of the claimed enzymes are well characterized and defined by the substrates recognized and products produced.

Ut is totally irrelevant and misleading to focus on whether or not the claimed enzymes function in a single pathway (see, for example, page 5 of the office action mailed on December 9, 2002). The Examiner appears to be using this as a basis for his assertion that "the interactions between the claimed enzymes are not predictable" (also see page 5 of the office action mailed on December 9, 2002). The claims are NOT directed to expressing the enzymes such that they exist in a single pathway (there is no mention of this term in any of the claims). Whether, or not, the enzymes function *in a single pathway* is completely irrelevant to enablement issues relating to an improved method for the production of polyhydroxybutyrate-co-polyhydroxyhexanoate *via* 1) the expression of a D-specific enoyl-CoA hydratase and β-hydroxyacyl-ACP-coenzyme A transferase, and 2) the provision of proper feedstocks to transgenic *E.coli* (while not relevant to enablement, the enzymes do function in a single pathway).

There is a legal presumption that the specification is enabling. Mere assertion by the examiner, as in this case, that the claims "are not enabled" is not permissible: the examiner must provide factual support for the position. Applicants may then rebut.

Although it is the undersigned's belief that the examiner has failed to make even a prima facie case of non-enablement, Applicants have provided numerous working examples in their specification; Applicants have provide factual proof of the availability of the enzymes, the substrates, and the resulting product.

There is nothing more required.

Claims 1, 6, 7, 10 and 14-21 were rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicants respectfully traverse this rejection to the extent that it is applied to the claims as amended.

The Legal Standard for Written Description

As the Court of Appeals for the Federal Circuit recently stated in Amgen v. Hoechst, *et al.* 314 F.3d 1313, 65 USPQ2d 1385 (Fed. Cir. 2003),

"the purpose of the written description requirement is to prevent an applicant from later asserting that he invented that which he did not; the applicant for a patent is therefore required to "recount his invention in such detail that his future claims can be determined to be encompassed within his original creation." Vas-Cath Inc. v. Mahurkar, 935 F.2d 1555, 1561, 19 USPQ2d 111, 1115 (Fed. Cir. 1991). Satisfaction of this requirement is measured by the understanding of the

ordinarily skilled artisan. Lockwood v. Am. Airlines, Inc., 107 F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (Fed. Cir. 1997) ("The description must clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed."). "Compliance with the written description requirement is essentially a fact-based inquiry that will 'necessarily vary depending on the nature of the invention claimed.'" Enzo Biochem v. Gen-Probe, Inc., 296 F.3d 1316, 1324, 63 USPQ2d 1609, 1613 (Fed. Cir. 2002) (citation omitted)."

Factual Analysis

The only time an applicant must provide the complete amino acid sequence, or gene sequence, is when they are claiming the chemical entity.

Applicants are not claiming a particular chemical entity. They are claiming a method for the production of a polymer, using a well-known bacterial expression system (*E. coli*) expressing known enzymes.

As the Court acknowledged in the Amgen decision, the written description requirement is different when one is claiming new combinations of known materials. Applicants are claiming new combinations of known materials. The materials are available to those skilled in the art. One can order the genes from the ATCC or numerous other sources, or obtain them by reference to scientific publications (as applicants note in their specification).

The written description in this case only requires that one describe what the invention is – not the chemical composition of all of its known elements.

Accordingly, applicants have complied with the written description requirement.

U.S.S.N. 09/235,875
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AMENDMENT AND RESPONSE TO OFFICE ACTION

Allowance of claims 1, 6, 7, 10, and 14-21 is respectfully solicited.

Respectfully submitted,

Patrea L. Pabst
Reg. No. 31,284

Date: October 3, 2003

HOLLAND & KNIGHT LLP
One Atlantic Center, Suite 2000
1201 West Peachtree Street
Atlanta, Georgia 30309-3400
(404) 817-8473
(404) 817-8588 (Fax)

Certificate of Facsimile Transmission

I hereby certify that this Amendment and Response to Office Action, and any documents referred to as attached therein are being facsimile transmitted on this date, **October 3, 2003**, to the Commissioner for Patents, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450.

Peggy Bailey

Date: October 3, 2003

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